The Northwestern MILLER

MILLING PRODUCTION SECTION

A Look-Around at Milling and Millers

By Paul L. Dittemore

Technical Editor, The Northwestern Miller

Editor's Note: The accompanying article was adapted from the text of an address delivered at the annual meeting of the Pacific District of the Association of Operative Millers at Walla Walla, Wash., Oct. 17.

MANY things have happened in the wheat flour milling industry in the U.S. in the years since 1947 when mills in this country established an all-time flour production record of approximately 306 million sacks. Some of the events that have taken place have not been of our choosing while others have been the results of a steady progression toward improvements in milling technology, industrial relations, and other things of equal importance and significance.

The pessimists inside and outside of the flour milling industry would have one believe that in a few years there would be no milling industry as such. They point to the steady reduction in the number of flour mills in the U.S., especially the sharp increase in the trend of mill closing since 1947.

An examination of Chart No. 1, prepared from data assembled and published by the Bureau of the Census, U.S. Department of Commerce, tends to erase a lot of the gloom that the pessimists would have us absorb.

It will be noted from the chart that wheat flour production in the U.S. during the past 10 years, with the exception of the three peak war-years, has remained relatively stable, and during the past two years has shown a slight increase. This has all come about in spite of the great reduction in the number of wheat flour mills.

For the most part, flour mills which have gone out of business have been those mills which the Census Bureau classifies as non-commercial mills—that is, small custom mills which limit their business solely to grinding of the farmer's grist. It is true that there have been a significant number of commercial mills which have either shut down or have been dismantled since the war years and most of those mills have been in the Southwest and were principally export flour mills.

A tabulation on mill closings in the Southwest since 1947 discloses that there have been, in that time, a total of 72 mills in Texas, Oklahoma, Nebraska and Kansas which have either been dismantled or have been put on a "stand-by" basis.

With the toll of more than 70 mills in five years in the Southwest, there has been a decrease in the number of operating companies. In Kansas, for example, there are now approximately 30 separate organizations operating flour mills as contrasted with 68 organizations in 1942, according to the analysis. But of those 72 mills which have been idled since 1947, 23, or approximately one third of them, are on a stand-by basis; that is, they are still in existence and could be put back into production again within a short time.

The loss in numbers of mills naturally would be expected to be greatest in the small non-commercial mills. The Census Bureau, in its monthly reports on flour production, states that its figures are obtained from "375 of the country's largest mills, which are believed to account for the production of approximately 97% of the flour." All this indicates to me that the mills that accounted for the bulk of the flour output before the war are still in business and will continue to be in business.

With reference to the small non-commercial mills—those of less than 400 sacks a day capacity—an analysis of data prepared by the Bureau of the Census discloses some other interesting points. A study of chart No. 2, showing the relationship between the size of the mill and the percentage of flour extraction discloses that, as a class, the small mills are not as efficient as are the commercial mills in the matter of flour extraction, with the lowest extraction being 67½%. It will be noted that as the size of the mill increases, its over-all efficiency increases to a point approximating, on a national average, 72%.

Translated into pounds of wheat required per sack of flour, this means that a mill of 100 sacks a day capacity on a national average requires 10 lb. wheat more per sack of flour produced than does a large commercial mill. Or, put another way, it means that a large commercial mill can get approximately 13 sacks of flour from the same amount of wheat required

(Continued on page 4a)

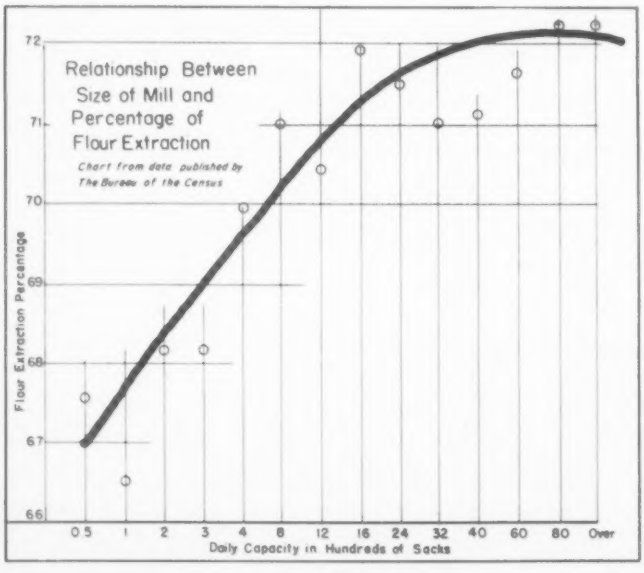

Chart No. 2

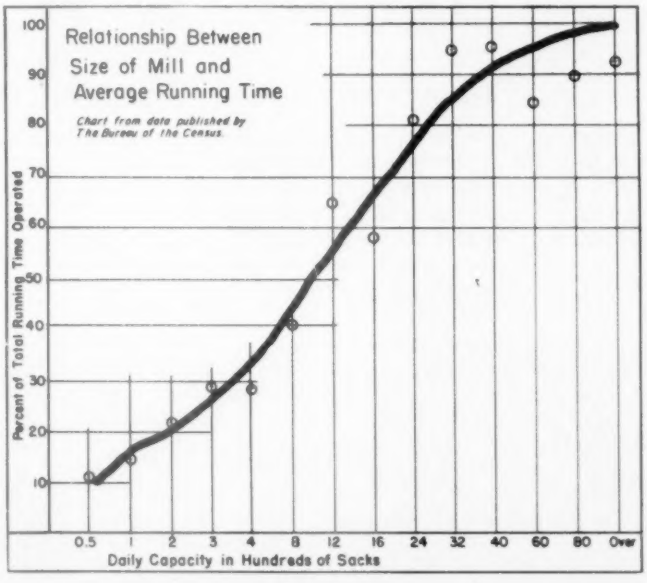

Chart No. 3

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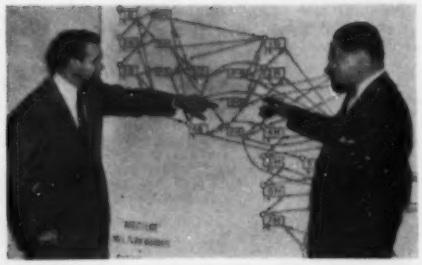
Glen Fisher, Fisher Flouring Mills Co., E. F. Seeborg of the Western Wheat Quality Laboratory, Pullman, Wash., and R. J. Hoskins of the Entoleter Division, Safety Car Heating & Lighting Co., during a pause in the convention.

Mr. and Mrs. George Lowery, Preston-Shaffer Milling Co., pictured with J. George Kehr, AOM president, at the banquet. The men in the foreground are, left, George Coon, Terminal Flour Mill, Portland, and George Cormack, right.



The direct-line flow diagram presented on the program by Henry Nelson, Fisher Flouring Mills Co., caught the interest of K. T. Whitby (left), University of Minnesota; and C. R. Veeck, sales engineer for the Strong-Scott Mfg. Co.

Pacific District, AOM 1952 Convention Report

By Paul L. Dittemore

Technical Editor, The Northwestern Miller

MEMBERS of the Pacific District of the Association of Operative Millers have a habit of producing an annual convention of their own that ranks in program quality, interest and organization with the national conference of the parent organization.

The 16th annual convention, held Oct. 16-18 at the Marcus Whitman Hotel, Walla Walla, Wash., was another in an unbroken succession of such events. Millers in the Pacific Northwest do not get to attend many of the national conferences because of the great distances to be traveled, so they do the second best thing—stage meetings that have become to be referred to as the "Little Nationals."

The paragraphs above may sound to the skeptics as an editorial bouquet. They're not intended to be a bouquet, but statements of fact. Seeing is believing and this writer now has attended three Pacific District meetings at intervals of three years. "Outlanders" who have been there for all of the meetings say that all of them are of a uniformly high quality. If the national AOM ever should decide to award a trophy or citation for excellence of district meetings, the men in the Pacific Northwest would win it, hands down.

Credit for these top-notch district meetings belongs properly to all of the men in the district, and not just a few wheel-horses who can be depended upon, year after year. In the 16 years that the district has been organized, there has been a big turnover in personnel, but still the district carries on. Perhaps one of the reasons is the comparative lack of the "Let George Do It" type of member.

The three-day affair started Thursday afternoon, Oct. 16, with registration and at 6:30 p.m., a "get-together" dinner was held and this was attended by approximately 150 of the delegates and wives. After the dinner the group attended a special showing of "Harvey" presented by the Walla Walla Little Theater. The Allied Trades Committee, in charge of entertainment had bought the house out for the event and the audience was composed entirely of operatives and allied tradesmen and their wives. The play was very well received and was something different in the way of entertainment sponsored by the allied trades organization.

John Egli, Preston-Shaffer Milling Co., Waitsburg, Wash., chairman of the district, presided at all of the sessions. Following an invocation delivered by the Rev. Luther Plankenhorn of Walla Walla, a welcome was extended by R. V. Borleske, mayor of Walla Walla, and what he had to say was a bit different from the usual mayor's welcome.

Mr. Borleske displayed an unusual knowledge of the part that the flour milling industry played in the development of the Pacific Northwest. He reminded his audience that Marcus Whitman, the first settler in Walla Walla, had built a grist mill and from that little beginning the town had grown to what it is today. He referred also to other localities in the Pacific Northwest and told the millers that they were "pioneers in more than one sense of the word." (Continued on page 18a.)

The Preston-Shaffer Milling Co., was well represented at the meeting. From left to right in the picture are Glen Romig, James T. Butler, E. H. Leonard, president; George Lowery and John Egli, who presided at the convention.

Glen Bayne, Preston-Shaffer Milling Co. (left), pictured with Henry Nelson, Fisher Flouring Mills Co., Richard Schmidt, General Mills, Inc., and Robert Hart, Igleheart Bros., Inc., winners in the annual district essay contest.

Leonard Kosderka, Spokane Flour Mills Co., is pictured as he received a diploma from Donald S. Eber, AOM secretary, certifying his completion of the Correspondence Course in Flour Milling, conducted by the AOM for its members.

Newly elected officers of the Pacific District are, from left to right, Homer Mesler, chairman; John Geddis, vice chairman; Francis King, secretary; George Lowery, national executive committeeman; Glen Fisher, district committee.

James W. Gilmore (left), general superintendent of the Centennial Flouring Mills Co., Seattle, pictured with Mr. and Mrs. Curtis P. Lindley, also of the Centennial organization, during the banquet held Oct. 17.

The above picture includes, from left to right, Mr. and Mrs. W. E. Forster, Forster Mfg. Co.; and Mr. and Mrs. Claude C. Hall, Crown Mills, Portland, Oregon, during the banquet. Young man on the extreme right was not identified.

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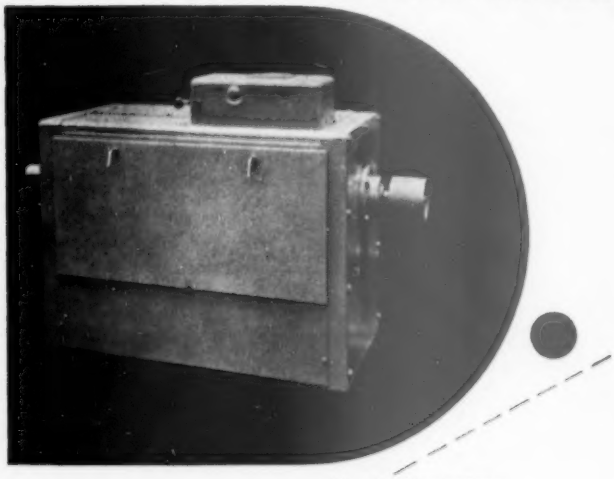

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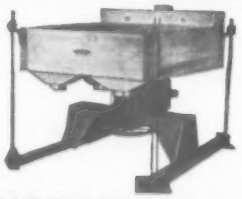

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A Look-Around

(Continued from page 1a)

by the small mill to produce 12 sacks of flour.

This is not to be taken as an criticism of the lack of efficiency on the part of the small mills but it is one of the things that are inherent in the small mill category.

Applying another approach to the Bureau of the Census data, it will be seen in Chart No. 3 which presents a comparison of the size of mill in relation to the percentage of running time, it will be noted that the small mill—mills of less than 400 sacks a day capacity—operate from 10% to 30% of peak capacity whereas the larger commercial mills approach, and sometimes exceed, 90% of capacity.

At first glance it might be concluded that the reason for the lack of

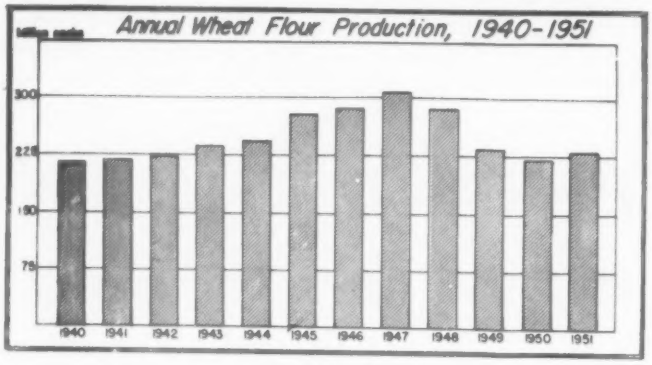
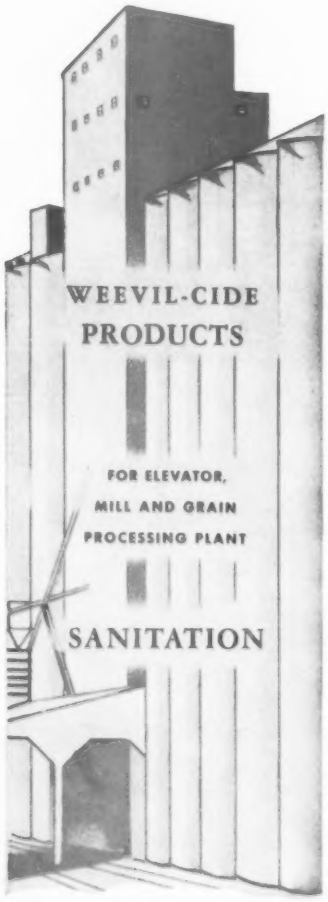


Chart No. 1



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running time on the part of the small mills is due to their inefficiency, since the two curves are almost identical. I do not believe that is the reason. It is my feeling that the great majority of mills in the "small" category are strictly custom mills and that there is little or no relationship between their over-all flour extraction efficiency and the amount of running time. Rather, the amount of running time is determined by the volume of their custom business; that is, they start the mill up and grind when they have wheat from nearby farms to grind.

The miller in the custom mill is not so much concerned with over-all efficiency, since in a large number of instances, the customer takes both the flour and the millfeed and gives the miller wheat as his toll for grinding.

This preliminary discussion leads us into an examination of the business of producing flour in large commercial mills and their performance, their improvement in operating efficiency, and other factors which bear upon their success as a business enterprise.

According to the annual statements issued by a number of flour milling companies in the U.S., the past year, or the past several years, in fact, have been pretty tough years. Competition has been extremely keen because of the disappearance of the export flour market and attempts to maintain volume by maintaining domestic production.

Since approximately 70% of the flour produced in this country is classed as bakers' flour, that portion of the total market has seen the most acute competition and it has been necessary for mills engaged in that type of flour manufacture to adopt every device and method possible to lower their costs of production in order to compete successfully for the business.

Millers, both production men and men on the management side, who have been waiting for that "revolutionary new process" or "radical change" as the solution to all of their problems have been disappointed because there has not been any single development that has accounted for a large reduction in production costs. Production costs have been lowered, however, and a statement published in a recent issue of the Hook-Up of the Millers National Federation shed some light on the size of those production costs reductions. The Hook-Up article stated:

"A current cost trend which deserves special attention is the widening of the spread between the expense of producing bakery flour and the expense of producing family flour. Going back two years to the 1949-50 report, mills predominantly in the bakery flour field had manufacturing costs of 41.8¢. Mills doing considerable business in both bakery and family fields had manufacturing costs of 46.9¢ while predominantly family flour mills had manufacturing costs of 54¢. In the year just passed, the bakery flour mills' manufacturing costs had increased 1.9¢ over the figure of two years ago, the combination mills had risen 4.3¢ and the family flour mills' costs were up 5.7¢.

"It is believed that two factors are responsible in great part for this increasing differential between the cost of making bakery flour and the cost of making family flour, one of which is generally recognized by millers and the other perhaps not so well understood.

"The factor which millers know only too well is the rise in hourly rates of mill labor which weighs more heavily on family flour production because it requires more production man hours per unit than does bakery flour. The other factor is the growing specialization and simplification which are taking place in the bakery flour mills with resultant production economies."

It may be concluded then, that the keen competition in the bakery flour field has caused millers, both managers and operators, to pay considerably more attention to reducing their production costs and the Federation figures seem to bear that out since, while family flour production costs were going up almost 6¢, the cost of producing bakery flour increased approximately 2¢.

Again, those production economies were not affected by any spectacular new milling process but by the adoption of a number of new developments or devices or methods, each of them contributing a small part to the lowered production costs.

It is my belief that it is only through the adoption of labor-saving devices and the use of more efficient machines with their attendant lower maintenance costs and increased efficiency that progress will be made.

It is a fundamental as well as an elemental axiom in any industry which depends upon volume rather than other factors for its profit, must eliminate as many in-process steps as possible and eliminate the continued or repeated handling of a product during its manufacture from the raw product until the article is put on the loading dock or in the freight car for shipment. Each time you handle a product you are adding to its cost of manufacture without adding anything to its value. It is for this reason that the more progressive mill superintendents have adopted the newer bulk handling and packing techniques and the economies effected in that department alone are quite significant.

A recent publication of the Bureau of Labor Statistics of the U.S. Depart-

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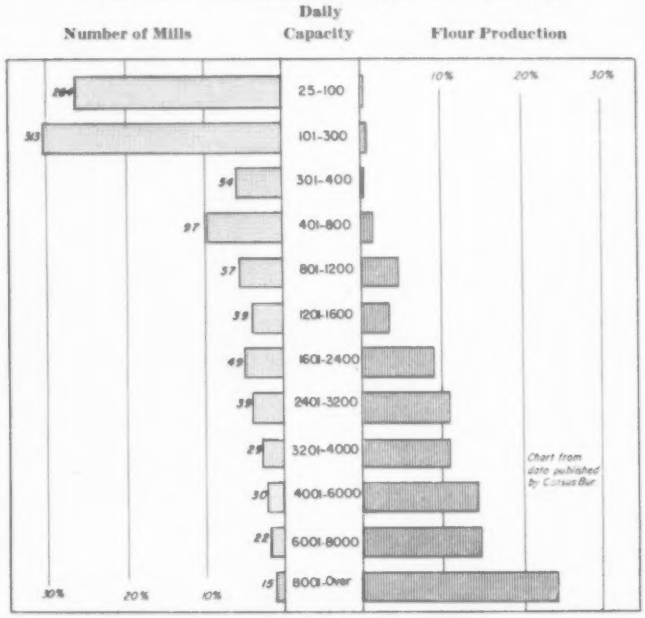
ment of Labor was quite critical of the milling industry for what it termed its "static state of technology." The Labor Statistics Bureau attempted to explain a declining productivity trend by employees in the flour milling industry with the following statement:

"The unfavorable man-hour per unit trend has occurred in an industry characterized by a general lack of technological progress. Capital investment is large and there exists more than enough capacity to fill normal demand. Almost all the milling machinery in operation today is old but still usable. Milling equipment lasts a long time and is expensive to replace. This combination of durability, high replacement costs, and excess capacity has resulted in a lack of incentives for the milling industry to

Flour Production by Capacity Groups



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engage in extensive research for improvements or to modernize. Moreover, the absence of a market for milling equipment has acted to curtail the research activity of machinery manufacturers. Machinery manufacturers have been somewhat reluctant to spend money on research on which there was no prospective return. Millers, in turn, showed little interest in investing in new equipment which was not improved enough to pay for itself in reduced costs. Consequently, there have been almost no radical changes in mills for about three decades."

If the above statement by the Bureau of Labor Statistics is to be regarded as an indictment of the milling industry, I think that the only part of the whole statement to which the industry should plead "guilty" is the statement regarding the absence of any radical changes during the past three decades.

There have been a number of improvements made during the past three decades in flour mills which have attempted to avail themselves of the latest developments in milling technology, materials handling and products control. Those improvements have been in the form of refinements on basic procedures and have, in a large measure, brought about a lowered production cost per sack of flour. That fact is borne out by the analysis of flour milling manufacturing costs as prepared by the Millers National Federation and referred to earlier.

Milling machinery and equipment manufacturers probably have spent more on research and development in the past 10 years than they had spent in the 30 or 40 years prior to the time the Research Committee of the Association of Operative Millers began its research and modernization program approximately five years ago. A few of the major items of equipment which have been improved through a cooperative research program between the AOM and the milling machinery equipment manufacturers, include: Roller mills, purifiers, packing equipment, dust collectors, materials handling and elevating equipment, sifters, power transmission equipment, and control equipment including automatic metering scales.

Progressive millers in this country have learned that, in a mass production industry, a small decline in the production or manufacturing cost of each unit, while in itself may appear to be of no significance, is of considerable importance and they have been quick to take advantage of all the newer methods which by themselves may not seem worth the investment, but when added up, make the difference between a profit and a loss.

A superintendent of a spring wheat mill recently told the writer that both he and his managers agree that the new and proven equipment is a very profitable investment, since it has been their experience that an increased efficiency, coupled with a lowered maintenance cost, constitutes a saving over trying to operate and maintain worn out or inefficient equipment.

Superintendents and managers of flour mills alike are getting out of the habit of being "price tag" buyers. It used to be that, "How much does it cost?" was the first question a manager or superintendent asked a machinery supplier. Now, the "how much does it cost?" question is gradually being relegated to one of the last questions. Whether you are buying a water pump, a typewriter or a sifter, the proper approach to a solution of the question, "Would it be a good investment?" is to figure out how that machine would operate in your plant—whether, through its increased efficiency and lowered maintenance or operating cost, it would account for a definite visible saving. Multiply that saving by the length of time that you would ordinarily anticipate as a life of the machine and that figure then should be compared with the price tag on the machine. It is only after you have figured out how much that machine would save, that you should compare your estimate with the cost of the machine and if your estimate is higher than the price tag, it would be foolish economy not to buy the machine or equipment.

One manufacturer of major items of milling equipment says that a return on a capital investment or a new milling plant would come from the following sources in their order of importance:

(1) Maintenance costs would be lowered. This includes plant maintenance as well as equipment maintenance since the newer plants are much cleaner and lubricating mechanism has been improved to require less attention to the machines.

(2) A large saving or reduction in the amount expended annually for fumigation and plant sanitation.

(3) An improvement in the milling results including flour yield, flour quality, percentage of patent flour, etc.

(4) Maintenance costs for materials would be lowered.

(5) Miscellaneous advantages, including the advertising value of a new plant, improved working conditions and the pride the individual workers take in the plant cannot be overlooked. These are not measurable in terms of dollars but it seems pretty well agreed that it would be an asset to any organization.

Another milling machinery manufacturer volunteers the information that, in his estimation, flour extrac-

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tion as a total could be improved from 1% to 2% due to better machinery, better conveying systems and better condition of the wheat. He also agrees that at the same time plant sanitation is improved.

This manufacturer said that today the situation has changed for millers in this country who are capacity minded, but at the same time are interested in producing standard brands of flour at a higher extraction rate. He also pointed out that a better designed milling equipment and improved conveying equipment bring new possibilities in the design of a flour mill, and as a consequence may account for the saving of much labor.

Evaluation of X-Ray Inspection Techniques for Insect Damage to Wheat

By Kenton L. Harris and J. Frank Nicholson
U.S. Food & Drug Administration

WE would like to discuss in a general way the background to the use of X-rays for the detection of internal contamination of wheat, summarize the recent developments, describe some of our own experiences with the X-ray technique and point out future uses of the X-ray work on grain.

It is a well-established, entmological fact that most of the important pests of stored grain spend at least part of their life cycle inside of the grain kernels. If, for example, we refer to the book by Dr. R. T. Cotton, "Insect Pests of Stored Grain and Grain Products," we find that the first six insects mentioned in the section on "Insects Associated with Stored Grain and Milled Cereals" are all insects which spend at least part of their lives inside of the grain. For example, the rice and granary weevils lay their eggs in stored grains, the larvae spend their entire life history feeding on the inside of the grain. It is not until the adult weevil bores a hole to the surface that there is external evidence of the internal infestation.

The lesser grain borer drops eggs on the grain and the larvae feed both on the surface and within the kernel, causing a great deal of both surface and internal damage. The larvae of the Angoumois grain moth develops entirely within the grain. Similarly, the saw-tooth grain beetle can be a pest doing its damage on the surface and within the kernels. Even the confused flour beetle and the rust-red flour beetle can follow the damage that other insects have made within the grain and continue to feed further within the kernels.

EDITOR'S NOTE: The accompanying article was adapted from the text of an address presented by Mr. Harris at the recent annual Tri-Section meeting of the American Association of Cereal Chemists, held at Kansas State College, Manhattan.

Source of Infestation Studied

It was to be expected, then, that when a (1)* was made of insect and rodent contamination of wheat and wheat flour that insect contamination within the wheat was the major source of contamination of flour made from that wheat. Not only are there fewer surface insects as compared with internal insects, but since they are largely removed by cleaning they present less of a problem so far as contamination of flour is concerned.

The information gathered by this survey was based on the two methods then available. One of these, known as the cracking and flotation procedure, has been used in our own laboratories and in the laboratories of some mills for several years. It depends on breaking open the wheat kernels to release the internal insects and then floating the insects out by the usual gasoline flotation procedure. The second method was developed by Frankenfeld (2) at the Bureau of

*Figures in parentheses refer to Literature Cited.

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Entomology and Plant Quarantine Station at Manhattan, Kansas. It is based largely upon the selective staining of the gelatinous cap covering the weevil egg puncture; we also use this same method as an aid in distinguishing the kernels which have been bored or eaten by insects.

Later, Milner, Barney and Shellenberger (3) reported that the immersion of weevil-infested grain in an aqueous solution of berberine sulfate resulted in the selective absorption of the alkaloid by the egg plug which then fluoresces under ultra-violet light. Apt (4), reported on a method for detecting internal infestation of wheat that used a procedure in which the grain was gelatinized with sodium hydroxide and the internal insects which were thus rendered visible were counted. This very brief summary brings us up to the work of Milner, Lee and Katz, who published a paper on the application of X-ray technique to the detection of internal infestation of grain (5)(6).

X-Ray Idea Not New

I have a hazy recollection that back in my University of California days when we were talking about stored grain tests that the entomologist not only dreamed of using X-rays, but actually tried out X-ray apparatus. These attempts to obtain a satisfactory picture were always unsuccessful. The successful outcome of the work of Milner's group is undoubtedly due to the fact that the problem was in the hands of people who had a thorough knowledge of radiographic principles and who could take the entomological problem and analyze it in terms of a radiographic problem. They clearly demonstrated that X-rays could be used to show insect damage from the completely hollowed-out kernels to the smallest surface nibblings.

About this same time, we recognized that there was a need in the industry for a rapid sorting technique which could be used to examine wheat samples and separate out those samples which were suspect and which, thus, should be subjected to a further examination. After trying out several visual criteria of internal infestation and after conferences with various industry groups, the U.S. Food & Drug Administration proposed the counting of "insect exit holes."

Exit-Hole Technique Developed

The exit holes procedure made use of ¼-pint portions. The wheat was examined by rolling a small amount at a time across a piece of fine sandpaper and counting the number of grains showing either an insect exit hole or a window. We recognize that in some cases it is difficult to distinguish between exit holes and feeding holes of surface insects or entrance holes of small larvae feeding on the surface of the grain. We counted as exit holes only holes in which the full extent of the boring could not usually be seen through the surface hole and, to exclude mechanical damage, we restricted our counting to rounded holes with smooth edges. The exit holes which we counted usually had a minimum diameter of about 1/32 of an inch. An examination of 173 samples which were a part of the 12-month survey of wheat, revealed that one exit hole was roughly equal to five insects by the cracking-flotation procedure. For a more precise determination, the two methods which best can be used to evaluate the amount of internal insect infestation are the cracking-flotation procedure and the X-ray inspection technique.

As is the case with any radiographic technique, it is necessary to be able to interpret the radiographic image in terms of the internal damage being studied. Since the internal damage of wheat appears as shadows on the radiograph, we dissected kernels showing suspect shadows and determined the cause of the radiographic image. Such a technique is necessary in order to interpret the radiographs in terms of actual insects and insect damage and in order to correlate and compare the radiographic techniques to other methods of insect detection.

By using this procedure, it was possible to differentiate on the radiographs between the various gradations of insect damage and seed characters which recemble insect damage. On the radiographs, it is possible to distinguish between seed characteristics such as depressions on the kernel surface, the partial separation of the germ layer from the endosperm, fractures in the endosperm, mechanical breakage, the receding of the endosperm from the bran coat along the crease, and insect damage such as weevil feeding and egg plugs, moth entrance holes, tunneling by moth and weevil larvae, and exit holes.

Radiograph Reveals Much

Depressions on the kernel surface show up as diffuse areas with a gradual variation of the depths of shadow on the radiograph. A receding germ layer or partial separation of the germ from the endosperm gives rise to a darkened, curved streak recembling a comma. Fractures in the endosperm appear as narrow, dark, straight streaks. Mechanical breakage often occurs along the fracture lines mentioned above and one surface at least of the mechanical break will have an abrupt, sharply-defined, straight edge. When the endosperm recedes from the bran coat of the crease, the radiograph may show one or two longitudinal tunnels, tapering and fusing at each end of the kernel with no break or opening occurring throughout the length of the tunnel.

Weevil feeding holes, egg plugs or

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"But . . ."

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larval entrance holes appear as a dot, an oval, or a line, depending on the orientation of the wheat kernel. If the tunnel is parallel to the X-ray beam, it will radiograph as a dot. When the damage is perpendicular to the X-ray beam, it will show as a straight line. All variations between these two extremes are possible, giving rise first to a shorter line and later, as the kernel approaches a parallel position, to an oval form. The intensity of the shadow is inversely proportional to the thickness of the tissue penetrated.

Little or no differentiation could be made between weevil feeding, egg plugs and moth entrance holes. The damage characteristic of early tunneling is a continuation of the above and varies from slight to extensive excavations as the larva grows in size. At times there are a series of fine, thread-like tunnels which may be enlarged to a completely hollowed chamber.

The intensity of the radiographic image varies from a very light gray in the case of the small tunnels to a dense blackening from those with extensive damage. Moth damage resembles that of the weevils, except for the frassy, granular material remaining in the kernel. As the tunneling becomes more advanced, the radiographic image becomes more pronounced. Exit holes appear as dark shadows on the radiograph representing a large excavation within the kernel and an accompanying intensely dark spot where the tunneling extended through to the surface as an exit hole. When little frass remains in the cavity, the radiographic shadow appears almost as dark as the background. Granular material within the tunneled kernel is likely to be due to moth larva pellets entangled in the webbing which prevents them from sifting out.

Live larvae, pupae, and to a lesser extent, adults can be seen and identified as such. Although dead larvae can be seen and identified as larvae, dead adults and pupae may produce no shadow on the radiograph. The visibility of insects on the radiograph apparently depends to a large extent on the presence of water.

Limitations of Technique

The usefulness of any technique for the examination of wheat depends not only upon the ability of the procedure to give an accurate appraisal of the degree of contamination, but also upon the speed with which the analysis can be made. In this regard, it should be noted that the examination of the radiographic image of 100 grams of wheat is not an examination involving one subject, but is an examination of three to four thousand objects, each one of which may contain a suspect shadow. For this reason, an examination of radiographs for total insect damage, including the most minute, is too time-consuming to be practical. A radiographic examination of 100 grams of wheat for all gradations of insect damage involved the precise scanning of each kernel and took a minimum of one to one and one half hours.

Moreover, dehydrated insects were not always visible and multiple damage was difficult or impossible to determine as such. Because of this and since more insect-damaged kernels were observed on the radiographs and dissected from the mounted kernels than were recovered by the cracking-flotation test, which has already been established as a reliable laboratory procedure, it was concluded that there would be little value in using additional criteria simply to increase the numerical value of the results. In addition, there seemed to be no need to embark on the difficult problem of interpreting radiographs to the extent of determining whether a particular shadow represented a live insect or a dead insect, or a pupa or adult, or in fact whether it represented an insect at all. Hence, the correlation was made between only the more readily visible (grossly) insect-damaged kernels and the cracking-flotation results.

Agreement Between Methods

Without going into the tabulation of figures, we can say that the correlation coefficient for the cracking-flotation test and the X-ray as a measure of gross insect damage is excellent (.88). For the 173 samples examined by both procedures, the X-ray results were 1½ times that of the cracking-flotation tests. The only part of the X-ray examination which requires the time of an expert technician is the actual examination of the radiographs. When examining for gross insect damage, this will take 5 to 10 minutes. A heavily contaminated sample takes longer to count than a sample with little contamination. If the tests were being used as a means of rejecting excessively contaminated wheat samples so that the counting of damaged kernels would be discontinued when an upper limit was reached, the elapsed time spent on the radiographs would seldom exceed five minutes.

Recent collaborative work initiated by George B. Wagner and participated in by several independent collaborators has shown that in spite of the fact that each of the collaborators

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examined the radiographs for different types of damage, there was a uniform basis of comparison between all of the collaborators. In other words, each collaborator did include in his examination a category or group of categories which corresponded to a category or group of categories used by each and all of the other collaborators. By selecting comparable categories, uniform results were obtained among all of the collaborators. In view of the fact that the collaborators had never examined wheat radiographs together as a group, this is quite gratifying. Each examining laboratory may have its own unique problem that influences the type of examination that it would make.

The X-ray technique is a means of directly viewing the contents of each individual wheat kernel without the necessity of using any intermediate cracking or flotation or other technique; thus, it should be the most accurate means of measuring internal insect infestation. To this advantage should be added the fact that a permanent visual record is available.

As far as techniques are concerned, this same collaborative work has shown that the laboratories now engaged in this work are now producing radiographs that can be read in our laboratory. We might prefer to have some with a little more or less contrast or a little more or less exposure but they all could be satisfactorily read. In this regard, it should be mentioned that there is apparatus commercially available now which will take excellent radiographs of wheat or corn and which has a range sufficient to meet most of the usual laboratory requirements which can now be anticipated.

Our own approach has been to produce a radiograph with a density gradation relative to the thickness of the wheat kernels. By analogy with ordinary visible light photomicrographic principles, it was felt that detail would be lost if there was little shadow or detail at the thicker portions of the kernels or if the thinner portions showed a density equal to the background. If the contrast becomes too high, the image of the grain is comparatively clear and there is an abrupt gradation to a density at the edge of the kernel which merges with the black background. This intense contrast which may be associated with the use of extremely low-energy X-rays may also be accompanied by an undercutting from the scatter of the long wave-length, low-energy, X-rays, so that the edges of the wheat may blend with the background and the wheat may appear smaller than is actually the case. The radiation emitted by a tungsten target, beryllium window tube contains more "hard" X-rays than the cobalt target tube so that there is an accompanying penetration of the wheat without overexposure of the background and thinner parts of the kernel. Used at about 18KV, it will produce a radiograph with not too high a contrast that can be read with a minimum of eye fatigue.

The X-ray technique shows promise as a means of obtaining a direct measure of internal insect contamination of wheat and other cereal grains.

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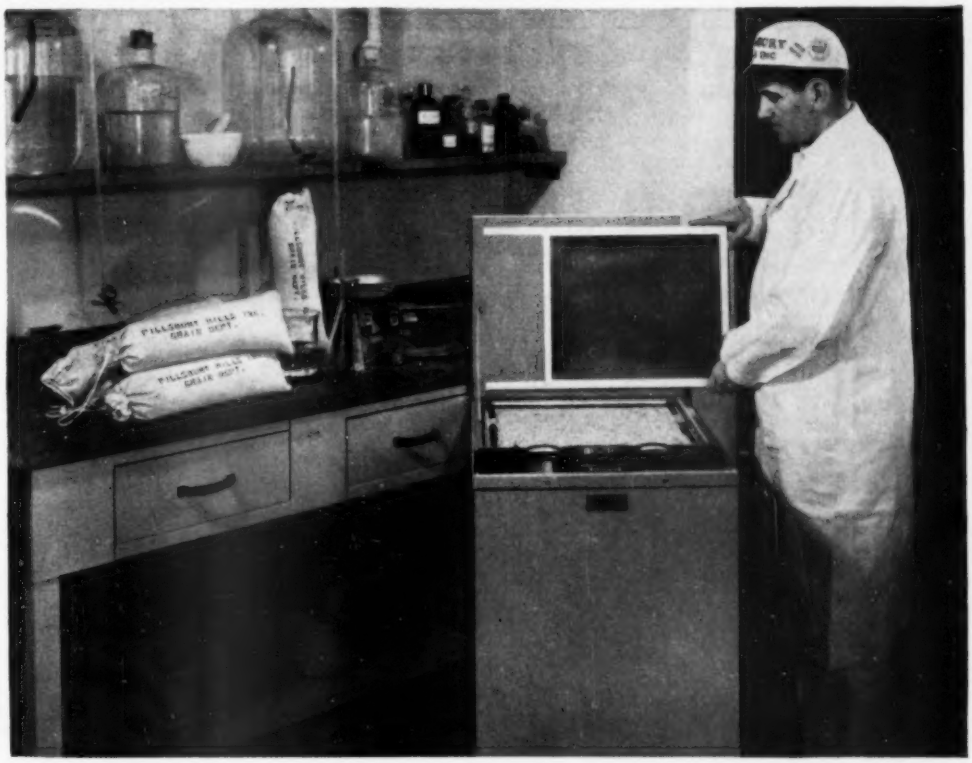
Symposium Notes Advancement in X-Ray Use for Grain Inspection

MANHATTAN, KANSAS—Considerable advancement has been made in the X-ray method of inspection of wheat for hidden infestation, it was revealed at a symposium on the technique which was a feature of the annual Tri-Sectional meeting of the American Association of Cereal Chemists, held at Kansas State College, Oct. 10-11.

An estimated 150 members of the Pioneer, Kansas City and Nebraska Sections of the chemists' association attended the two-day meeting which was divided into two symposiums. The first, on Oct. 10, covered the field of X-ray use in grain grading, and the second, held Oct. 11, had biological oxidation and reduction as its subject.

Altogether favorable comments on the X-ray technique were given by Kenton L. Harris, Food & Drug Administration, Washington, D.C., the first speaker on the program. He reported that his bureau found the process very useful in wheat inspection and he regards it as an absolute equal to the exit-hole procedure. The X-ray test obviously is better than the cracking flotation test, he declared, and he indicated there is a strong possibility that FDA will put its stamp of approval on it in the near future. As an official test, it is likely that the X-ray will gain even wider use in the milling and grain industries.

There presently are 29 X-ray ma-



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That's what Pillsbury's G. B. Wagner says about x-ray grain inspection technique

"As entomologist for Pillsbury Mills, chairman of the Sanitation Committee of the Assn. of Operative Millers, and chairman of the Sanitation Committee of the North-West Crop Improvement Assn., I believe:

"The x-ray technique for detecting 'hidden infestation' in grain is a great advance in the securing of sound grain for milling purposes. Unfortunately, the technique is not as simple as we would like to see it in order that it could be adopted by country elevator operators accepting wheat from farmers.

"Once interpretation of the x-ray is understood, a complete story of the storage of that particular lot of wheat becomes evident. Shrinkage in weight of grain and loss in milling value can be rapidly calculated. In my opinion, it is only a question of time until this or a similar technique will be incorporated in the Grain Standards under which a greater proportion of all grain is marketed."

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chines in use for wheat inspection in the grain and milling industries, it was reported. Three commercial exhibits were on display to those in attendance. The machines shown were manufactured by General Electric Co., Milwaukee; Westinghouse Electric Co., Baltimore, and the Picker X-ray Co., New York.

Of particular interest at the exhibit was the Picker machine which used the application of the Polaroid Land camera technique to the X-ray process. One drawback in X-ray inspection work thus far has been the time required to develop the films and the expense involved in equipping and maintaining a dark room. The Picker machine uses a Polaroid Land camera from which the developed film may be taken within a few minutes. Use of this technique still is in the advanced stages of development and there is no comparison of the cost of operation between it and the standard X-ray process. It was one of the new developments revealed at the symposium, however.

Approximately, the symposium was held on the Kansas State campus where early work on the X-ray has taken place. Research leaders in the Kansas State project have been Dr. Max Milner of the milling industry department and Dr. Robert Katz of the physics department.

The results of a collaborative study on the interpretation of radiographs of infested wheat was of special interest to the members. The question was whether different persons would read the same radiographs similarly and thereby establish a standard "spread" or area of agreement. The report was presented by Burton A. Burquist, a member of the staff of the department of economic biology, Pillsbury Mills, Inc., Minneapolis, in the absence of George B. Wagner, head of the department.

Agreement between technicians who took part in the study was excellent, Mr. Burquist reported. Six technicians took part in the project.

Mr. Harris of FDA commented, after hearing the results of the study, that never before has he seen such high coordination of readings of inspection tests.

A discussion on appearances of various infesting insects was participated in by H. H. Walkden and Norman M. Dennis of the Division of Stored Products Insect Investigations, Bureau of Entomology and Plant Quarantine, Manhattan, Kansas, and Norman E. Lloyd and Dr. Milner of the college staff.

An open forum discussion, led by Eric J. Kiteley of International Milling Co., Minneapolis, dealt with the subject of inspection in practical application. All of those present who make use of the technique agreed that the X-ray process was superior to the cracking flotation test.

R. I. Throckmorton, dean emeritus of the school of agriculture, Kansas State College, and Dr. J. A. Anderson, head of the laboratories for the Board of Grain Commissioners of Canada, Winnipeg, and current president of AACC, were speakers at a banquet held Oct. 10. Dr. Anderson revealed that more than 30 AACC committees were currently active in association work.

Mr. Throckmorton told the chemists that there is a definite relationship between the amount of moisture in the soil at the time of planting a crop of winter wheat and the resultant yield. On the basis of this relationship, he said, there should be grave concern over the outcome of the 1953 crop because high moisture deficiencies have occurred throughout the Southwest this fall.

Commenting on wheat varieties, Mr. Throckmorton was positive in his assertion that there is no truth in the idea that wheat varieties change in character through the years. Variety characteristics, he said, are constant.

As to approval of new varieties, Mr. Throckmorton assured the chemists that no new variety is given a recommendation until it has been proved superior to the variety it was intended to replace.

On this score the speaker said he believed that the newly developed Ponca variety of hard winter wheat will soon replace Pawnee, which comprises about a third of the total wheat acreage in Kansas.

The final session Oct. 11 was a highly technical symposium on oxidation and reduction, participated in by Dr. K. K. Burkhard, department of chemistry, Kansas State College; Dr. Betty Sullivan, vice president and director of research, Russell-Miller Milling Co., Minneapolis; Dr. Anderson; Dr. R. T. Holman, Hormel Institute, Austin, Minn., and Dr. E. S. Guzman Barron, University of Chicago.

PRESIDENTS IN ABUNDANCE

MANHATTAN, KANSAS—Former presidents of the American Association of Cereal Chemists were in abundance at the annual Tri-Section meeting of the organization, held Oct. 10-11 at Kansas State College, Manhattan. In addition to Dr. J. A. Anderson, current president of AACC, the following past presidents were in attendance: Dr. J. A. Shellenberger, head of the department of milling industry, Kansas State College; James Doty, director of the Doty Laboratories, Kansas City; Dr. H. K. Parker, Wallace & Tiernan Co., Inc., Newark, N.J.; Dr. Betty Sullivan, vice president and director of research, Russell-Miller Milling Co., Minneapolis, and Dr. R. A. Sandstedt, department of agricultural chemistry, University of Nebraska, Lincoln.

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Control of Humidity in Flour Mills

COOLING of air is usually closely associated with the process of humidification and dehumidification. The terms cooling and refrigeration are virtually synonymous, both referring to the process of lowering the sensible heat of an object and, in the case of air, its dry bulb temperature. Refrigeration, however, is usually accomplished through the aid of a refrigerant in a continuous thermal cycle and, consequently, frequently implies a relatively cold, final temperature. Cooling can be accomplished in numerous ways, most of which depend upon contact with a cooler substance or admixture with a cooler one.

With a standard type of air washer used for general air conditioning, the spray water is, in winter, heated and any desired condition can be obtained easily when humidification is necessary. For dehumidification there are limits to the conditions possible when using standard apparatus. In this case the spray water is chilled and the air, in passing through the apparatus, is first converted into a saturated condition and then cooled by its contact with the chilled water, moisture being condensed out in the process.

The degree of cooling is governed by the conditions required in the room to be treated and there is a limit to the reduction owing to possible freezing of the spray water if chilling is carried too far. In practical operation this represents air at above 40° F. and saturated at the outlet from the spray apparatus, and this air, when suitably reheated either by heat evolved in the treated room, or by external artificial means, will produce atmospheric conditions according to the following table:

Temperature °F ...	70	65	60	55	50	45
Relative humidity %	34	40	48	57	69	82

It will be observed that if, say, 48% relative humidity is desired, it would be impossible to produce with spray type apparatus a lower temperature than 60° F. in the treated room, as otherwise the dew point would be less than 40° F. which, as previously shown, is the normal limit of reduction.

Very careful consideration is necessary as to the minimum requirements in the treated room, as a few per cent higher in R.H. will make a considerable difference to the price of the apparatus.

The chilling of the spray water for dehumidification involves the installation of suitable refrigerating plant which may be either of the mechanical compression type; the absorption type; or the steam jet vacuum type; depending upon the duties to be performed.

In many industrial installations where humidifying or dehumidifying systems are used, some means of positively and accurately maintaining the proper temperatures and humidities is essential. While much can be accomplished by hand regulation, this would require the constant attention of a highly skilled operator, which in most cases is impracticable. Automatic controls in themselves are a special and complicated study, but, broadly, the instruments employed comprise thermostats and humidistats with sensitive elements exposed in the air, these operating (through the medium of compressed air or electricity) diaphragm valves, air motors, motorized valves, or solenoid valves.

These pieces of apparatus can be defined briefly as follows:

Thermostats are instruments which respond to small changes in temperature.

Humidistats are used to control relative humidities and have some form of hygroscopic element which is influenced by the changes in R.H.

Diaphragm valves are used to control the supply of steam or hot water to air heaters and ejector heaters.

Air motors are employed to operate fresh air and return air multileaf dampers in airways, also by air-passes, waste air shutters, etc.

Motorized valves serve the same purpose as diaphragm valves, but are operated by current controlled by electric thermostats or electric humidistats.

Solenoid valves are "on" and "off" valves in steam or hot water lines.

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electrically operated by impulses from thermostats. They differ from motorized valves in that they are not able to take up a "floating" position which the former give.

There are four distinct methods by which automatic control can be secured:

(1) By two separate thermostats, one of which is placed at the humidifier to control the temperature of the dew-point by an automatically operating valve or damper, governing a means of varying the temperature of the spray water, of the entering air, or of both in conjunction. The other thermostat, placed in a room where the humidity is controlled, maintains a constant room temperature, either by controlling the temperature of the air entering the room, or by controlling some source of heat within the room. With these two temperatures maintained constant, the percentage of humidity in the room will remain constant, and will depend upon the difference between the dew-point temperature maintained at the humidifier and the temperature maintained in the room.

(2) By a differential thermostat. This type of dew-point control is required wherever it is impracticable to maintain either a constant dew-point or a constant room temperature. In this method there are two elements, one of which is exposed to the dew-point temperature, while the other is exposed to the room temperature. They are so connected that they act conjointly upon a single thermostatic valve connected with operating motors arranged to control the dew-point temperature in relation to the variable room temperature or to control the room temperature with respect to the variable dew-point temperature.

(3) By regulating the mixture of fresh and return air. This type of control is desirable where recirculation of air is practiced. A thermostat placed after the air washer is set at about 40° and controls automatically the mixture of fresh and return air. This prevents the danger of both freezing and over-humidification. Moreover, it is an economical method in that the heat in the recirculated air serves to temper the cold, fresh air, while the latter lowers the absolute moisture content of the re-circulated air. Special care should be used to effect a thorough mixture of the air before it enters the washer.

(4) By means of some form of differential hygrostat. This controls the wet-bulb temperature with respect to the dry-bulb temperature, so as to maintain a constant relative humidity without regard to the dew-point or variation in room temperature.

No type or make of automatic control is able to give absolutely uniform conditions and, therefore, working tolerances must be allowed. In general, 1° F. and 2% R.H. are considered satisfactory tolerances. These apply to the operation of the instruments themselves and usually there is a lag in the final conditions, but modern automatic controls can be provided to reduce the lag to a minimum. In a typical semi-air conditioning plant, the method of operation is as follows:

Air is drawn from the outside atmosphere, through louvres in the wall, to the humidifier into which water is pumped through sprays at sufficient pressure to ensure complete atomization. From the tank, the water, after straining, circulates through a calorifier which raises the spray temperature when required. There is an automatic control in the steam supply so that the spray temperature can be regulated according to the temperature of the air passing to the fan. From the fan the air is blown up the main ducting to distribution trunking on each floor. Inside the trunking serving each individual floor there is a gilled tube heater operated automatically from the steam supply line.

All automatic controls are worked by compressed air from a clean supply at constant pressure.

Controlled conditions are maintained very well providing the dew-point temperature of the air after leaving the humidifier does not exceed 46° F. However, in warm weather when the incoming air may enter the fan at, say 60° F. and 100% R.H., the effect of the hygrostats is to operate the heaters so that air still enters the mill at 60% R.H. but would be at a temperature of 76° F.

Thus, whenever dew-point rose above 46° F. the temperature of the mill also went up and, consequently, in summer the mill atmosphere became unpleasantly hot. The system of controlled humidity was eventually abandoned and the plant now operates purely for filtering and forced ventilation, viscous filters having replaced the air washer/humidifier. The air heaters are used occasionally to warm the mill during cold weather.

The application of refrigerating plant to cool the spray water would have overcome the trouble in summer, but this was not done owing to the comparatively high cost involved over the initial installation.

It will be clear, therefore, that there would be little purpose in returning warm, humid air from the mill to a semi-air conditioning plant for mixing in any quantity with outside air, otherwise the final tempera-

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ture would be too high for controlled conditions to operate, except in the coldest weather.

Complete Air Conditioning

It has been shown that a semi-air conditioning plant (that is, without means of refrigerant cooling) will maintain constant conditions of relative humidity all the year round and constant temperature during the winter months only. In summer, the mill temperature will vary under the influence of outside weather. High temperatures in the mill during warm weather will cause poorer dressing and consequent irregularity in the milling process. There seems little purpose, therefore, of installing expensive equipment which will carry out the function of creating, accurately, optimum atmospheric conditions for part of the year only.

It is not proposed to outline all the various systems of complete air conditioning which will provide constant values for R.H. and temperature all the year round; they are innumerable, especially the lay-out of automatic controls. The essential principles have been outlined and the technical refinements are very much the sphere of the air conditioning engineer. Whether one particular type or another is installed depends largely on the limits of R.H. and temperature required, and the cost involved.

Two other factors, however, can be considered. First, it may be advisable in some industrial districts where atmospheric pollution is high to incorporate an extra filter medium of, for example, the viscous type placed before the humidifier and washer in order to achieve a greater degree of air cleanliness. This, of course, will not affect conditions of humidity and temperature, and is really an additional refinement within the meaning of air conditioning. Second, whether it is worth while recirculating air from the mill exhaust system.

Recirculation of air has not found approval in the systems of ventilation or semi-air conditioning previously discussed owing either to flour dust contamination and/or high humidity and temperature. A complete air conditioning plant can be designed to incorporate the return of exhaust air in whole or part, and the most favorable method is to mix returned air with fresh air before conditioning by automatic control, in such proportions that the minimum of heating or cooling is necessary, therefore effecting a saving in operating costs. Dust control would normally be taken care of by the washer but in practice it has been found that in the case of air returned from cyclone dust collectors the air washers choke with gluten and flood. No doubt elimination plates also become foul in a short time for the same reason. It is essential, therefore, that returned air should be cleaned thoroughly first, and to achieve this it should be filtered by a suction-filter dust collector. The most suitable air for returning comes from the purifiers as it is less humid, contains less fine dust, and possesses the least odor.

It is only really advisable to return higher temperature exhaust air during cold weather in order to reduce steam heating to the humidifier, but to offset this saving is the capital expenditure involved in the installation of S.F.D.Cs. for the purifiers exhaust system and the trunking for return air, which, in addition, takes up considerable space in the mill. In summer time it would be cheaper to condition fresh air only as this would be cooler than exhaust air and the latter would require additional cooling by the refrigerating plant. Unless, therefore, the mill is situated in a country where very severe winters are encountered, it is very doubtful whether returning exhaust air is in fact an economical proposition, in which case a complete air conditioning plant to afford treatment to fresh air only, should alone be considered practical for flour mills.

Unit Air Conditioners

A more recently developed method of air conditioning is available in the form of simple self-contained cabinets for heating, cooling, humidifying, dehumidifying and cleaning the air. They may be arranged to perform summer cooling, winter heating or all year round conditioning. The smaller units can be mounted or hung in any convenient position, while the larger vertical units require a minimum of floor space. Capacities vary from about 800 to 11,000 cu. ft. air per minute. While air is drawn in at the back of the cabinet, treated air is blown out of the top by special air diffusers into the mill atmosphere. Usually, the unit must be located near a window or wall opening and a duct connection made to the back of the casing for the admission of fresh air.

If it were not possible to install a central station air conditioning plant in an existing mill, these unit air conditioners could be placed on each

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floor with the advantage of having individual conditions of temperature and humidity produced from each one if necessary. Complete control of the mill atmosphere would hardly be possible owing to the centralized air distribution from each cabinet, but conditions could be influenced and improved considerably. Such a system has the advantage of requiring no air distribution trunking, but one of the major disadvanatges is that steam, water and electrical connections have to be provided for each unit.

Conclusions

1. To obtain the ideal conditions of clean air evenly distributed throughout the mill at constant and controlled temperature and humidity all the year round, a complete air conditioning plant of the central station type with air distribution trunking is recommended, and this will give the most effective assistance in attaining regularity and improved quality of mill products.

2. When the extent of capital expenditure is limited or structural problems render (a) impracticable, a simple system of filtering and forced ventilation of air will improve atmospheric conditions in the mill, result in cooler stocks and consequent better dressing, and provide dust free and more hygienic products.—**Milling.**

World Oats, Barley Production About Equal to Last Year

WASHINGTON—World production of barley and oats in 1952-53 is forecast at about 131 million short tons, according to information available to the Office of Foreign Agricultural Relations, U.S. Department of Agriculture.

The current crop, on the basis of the tentative forecast, would be about the same as the 1951 total for these grains, but would be above average. A moderate increase in barley production offsets a decline from last year's world oats outturn. Compared with the prewar period, the increase in barley is substantial, more than offsetting a decline in oats.

World barley production is forecast at about 2.7 billion bushels compared with 2.6 billion in 1946 and a prewar average (1935-39) of 2.4 billion. Substantial increases are estimated for all continents but in the Soviet Union, where acreage of both barley and oats appears to have been reduced substantially from the prewar level. The world oats crop is now forecast at 4.1 billion bushels, compared with 4.3 billion in 1951 and the 1935-39 average of 4.4 billion bushels. Compared with the prewar period, production is up sharply in North America

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but is considerably smaller in other important producing areas.

In North America the 1952 barley production is placed at 522 million bushels. This is slightly larger than the previous harvest and is a 58% gain over the 1935-39 average. Of the 522 million bushels estimated for 1952, Canada accounts for 295 million bushels. This is an all-time record barley crop for Canada with record acreage and near-record yields reported. Yields, at an average of 34.8 bu. an acre, compare with the long-time average of 24 bu. an acre. Barley production in the U.S. is reported at 221 million bushels. This is less than in 1951 principally because of reduced acreage, though yields are fractionally below those of 1951.

Production of oats is estimated at 1,742 million bushels, 26% above the 1935-39 average but slightly below the 1951 total harvest for North America. The reduction from last year's high total occurred mainly in the U.S., with only a slight reduction reported for Canada. The smaller crop of oats in the U.S. is attributed to reduced yields with acreage moderately above the 1951 acreage. Acreage was, however, still below the average of the preceding 10 years. The crop in Canada, though slightly less than in 1951, was well above average.

The outturn in Europe was larger than in 1951 for barley but smaller for oats. Barley production, estimated at 805 million bushels is 21% above the prewar average and 36% above the 1945-49 average. The increase over the 1951 barley production was mainly in Spain, the U.K., Denmark and France. These four countries together account for almost half Europe's total barley production.

Oats production of 1,380 million bushels compares with 1,455 million in 1951. Reductions were fairly general for oats, except in Scandinavia, but the largest reductions were in France, western Germany and the U.K. Acreage was reduced in France and western Germany but in the U.K. was larger than in 1951. Smaller yields were reported for all these countries.

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GRAIN SANITATION GROUP PLANS RODENT CAMPAIGN

WALLA WALLA, WASH.—Arrangements are being made for a joint meeting of country grain elevator operators and commercial pest control specialists to develop standards of operation and fix responsibilities between storage operators and pest control men to effect more efficient rodent and bird control.

The joint meeting will be held under the auspices of the Pacific Northwest Grain Sanitation Committee and will be held some time during November. Robert O. Fletcher, secretary of the association, said that notices will be sent out when arrangements are completed.

The committee held a meeting in Walla Walla recently and it was agreed that rodent and bird control around country elevators was the major problem in the area.

The meeting was attended by 35 representatives of the milling and grain trades, staff members from the four state colleges in the region and commercial pest control operators.

It was agreed that actual clean-up of farm grain storage facilities has been generally disappointing and it was the opinion of the committee that real progress will not be made until the Food & Drug Administration begins to take positive action through enforcement in the region to provide more incentive to operators.

Chemists Develop Simplified Method for Flour Testing

MINNEAPOLIS—A simplified method is described in a recent issue of Cereal Chemistry for the determination of bran and germ particles in wheat flour. The method consists essentially of staining the flour with 0.05% Crystal Violet, digesting the starch and protein with 1% sodium hydroxide and filtering on a filter paper.

The pieces of bran and germ appear as violet particles while endosperm cell walls and digested starch and protein, which are also deposited upon the filter paper, are colorless. The authors state that the violet-colored particles may be counted or the color density measured to give an accurate evaluation of flour refinement.

The method was described in an article by R. A. Larkin, M. M. MacMasters and C. E. Rist of the Northern Regional Research Laboratory at Peoria, Ill. The authors state that the method may be of use to the milling industry and that the procedure is rapid but little skill is required on the part of the operator. An added advantage is that a minimum of special equipment is required and they claim that the method offers a means for the direct determination of flour quality since, by the use of the method, the miller can easily study the effects of changes in mill procedure upon the refinement of the flour obtained and the milling engineer can also evaluate the separation effected by modified or newly designed machinery.

Detailed instructions regarding the use of the method are described in the article referred to above.

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Pacific District

(Continued from page 5a)

Mill management in the Pacific Northwest has always taken an active interest in the affairs of the Association of Operative Millers and it was represented at the operative's meeting by E. H. Leonard, president of the Preston-Shaffer Milling Co., Walla Walla. He told the operatives that millers were just as important in the milling industry as management and that the relationship between management and production should always be maintained at a cordial level. He advised the operatives not to take a "negative attitude" toward their managers but to maintain the degree of cooperation so essential to any successful enterprise.

J. George Kehr, Russell-Miller Milling Co., Buffalo, president of the Association of Operative Millers, was introduced by Mr. Egli and spoke briefly on the importance of the maintenance of a high degree of interest in the district organizations of the Association. He reminded the members of the Pacific District that it had contributed much to the success of the AOM and that men prominent in the national organization who were from the Pacific District included George Walker, Dewey Robbins, Donald Eber and Willard Meinecke. "Probably you have contributed as much talent to the organization as any district in the U.S.," Mr. Kehr said. He said that the type of meeting that the district conducts annually was a mark of outstanding achievement and served as an added incentive to the younger men in the organization.

Should Encourage Young Men

Mr. Kehr reminded the older operatives in the audience that they should continue to encourage the younger men in the district and he said that it is a "good miller's obligation to 'pamper' these young men in order to develop their interests in the field of milling technology." Mr. Kehr urged his audience not to feel that it is a "lost cause" but to continue their good work with the younger men.

"Training, a Big Job," was the title of an address presented by W. H. Meinecke, plant superintendent of the Tacoma, Wash., plant of General Mills, Inc. Mr. Meinecke presented a resume of the experiences of the milling industry during the past five or six years in the task of providing employees for all jobs to be filled in the mill. He said that any employee training must teach the employees all that they should know about their jobs.

He said that employee turnover in flour mills in the past five years has been rather high because of terminations and vacations. The vacations, he said, average a little better than two weeks a year an employee, or 4% of the total work time and added that employees, like managers, like to take their vacations in the summer time and as a result the vacation replacement is sometimes as high as 20% of the work crew.

Mr. Meinecke said that a job which requires skill should have an adequate "backstop"—that is, someone trained in the duties of a job who can step in and take over if necessary. He said the total requirements for job training included the following: What kind of training, how long a training period, how many instruction methods are necessary, what outside teaching aids could be used and the goal of the training program.

Big Job in Training Program

The biggest job in any employee training program, Mr. Meinecke said, is to induce people to want to be trained. He admitted that sometimes this is a rather difficult goal to achieve since there are several different factors to be taken into consideration.

He said that it was a mistake to attempt to sell a training program with a lot of false promises of "better days" ahead. He advised that the objective of the training program should be stated clearly and the trainee must be given an objective. He said also that each employee should be given personal attention of the supervisor and that his progress of the training program must be followed. If the employee was not attaining his goal, some reasons should be determined why. He emphasized the necessity of putting the training program on a personal basis. He also said that attention should be given to the trainers as well as the trainees and that the training program, once it is set up, should be revised each year to bring it up to date by taking advantage of new training techniques and other teaching improvements.

A report on some preliminary research in the use of an air jet separator in flour mills was presented by K. T. Whitby. Mr. Whitby is an instructor in the Department of Mechanical Engineering at the University of Minnesota and is associated with Prof. John M. MacKenzie in the curriculum in flour milling engineering.

The speaker said that the idea of separating mill stocks was not a new one and that the patent files and literature show that "there is nothing new under the sun" regarding the idea of using air. He added that in the future, the air machines will be "better engineered and applied." (The principle of the air jet separator was explained in an article by Mr. Whitby in a recent issue of this journal.)

Advantages of Air Separation

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overload will not affect its performance. (2) An air separator offers the possibility of a simple design of machine for all operations. (3) An air separator can be manufactured at much lower cost than a purifier. Mr. Whitby estimated that air separators could be sold for approximately one half the cost of purifiers.

Mr. Whitby's address was supplemented with the showing of a number of projection pictures to illustrate the physical differences in the stocks separated in the air jet machine and also some of the data regarding ash content of the different fractions taken out by the machine. He stressed that an air separator is not a "cure-all" for any flour mill and added that it must be applied in its proper place to obtain maximum results.

"New Developments and Trends in Sanitation" was the title of an address presented by T. F. Winburn, manager of the Industrial Fumigant Co., Kansas City. He reviewed the developments in grain and flour mill sanitation during the past few years and made reference to the study of insect and rodent contamination of wheat and its products made by the Food & Drug Administration. He pointed out that the conclusions of the FDA survey were that flour mills did not contribute to the contamination of finished flour, that a large perecentage of the wheat arriving at the mills for processing was contaminated with insects and that present-day machinery did not remove all of the contamination during the cleaning and milling process.

The remainder of Mr. Winburn's address was devoted to specific recommendations as to how the farmer, country elevator operator, terminal elevator operator and miller may safeguard the sanitary storage, handling and processing of grain.

"Your main contribution to hastening the success of the sanitation program would be to purchase only sound, sanitary wheat," Mr. Winburn told the millers. "That is, of course, much easier said than done if you wish to continue to operate. However, if you all could adopt the program of testing all your milling wheat by any of the various tests to determine its fitness for milling and reject all wheat that is not in a sound and a sanitary condition, you would hasten this grain sanitation program to success much faster than all the government regulations ever will." Mr. Winburn said that the most important step in the new sanitation program is to "show interest and progress in moving toward the standards that have been set up."

One of the prize-winning essays was presented by Richard Schmidt, General Mills, Inc., Tacoma. Mr. Schmidt's essay dealt with the attitude of employees toward their jobs and toward their employers and made the observation that "very few men in the mill are interested in self-improvement." He said they apparently all want higher paying jobs and that this offers a challenge to management in emphasizing the need of developing a personal interest in one's job.

Competitive Spirit Lacking

Regarding the lack of interest, Mr. Schmidt said that the individual worker, management, labor unions, public schools, must all share the blame. He said that the average individual has lost the spirit of competition and takes very little pride in "a job well done." He urged for a redevelopment of moral integrity and said that management must recognize its responsibility, since the first and biggest change must come from mill management. Referring to labor organizations, Mr. Schmidt said that they, too, must recognize the responsibility of organized labor and must work to easing the tension between labor and management today.

James E. Butler of the Preston-Shaffer organization followed Mr. Schmidt on the program with a discussion of the need for maintaining better or improved labor relations.

It is only at the level of close personal contact that good relations are established between management and employees, Mr. Butler said. He said that management should keep in mind constantly that the employees prefer union membership and that management should recognize this and attempt to work more closely with labor unions in maintaining employee relations.

Mr. Butler said that the following points should be observed in maintaining satisfactory employee relations:

(1) Know your labor agreement and live up to it. He said that labor contract between the union organization and management should be studied carefully so that each side will know its obligations and its rights—what it can and what it cannot do.

(2) Do not try to interpret any vague or doubtful points in the contract. He advised that, when in doubt, the contract should be checked with the business agent or other union representative and a clear understanding as to the interpretation as to the point in question should be reached. He said that a manager should not hesitate to discuss mutual problems with representatives of labor organizations. It is only by a free and open discussion that better relations will be maintained with the representatives of the unions, he said.

(3) Work closely with your supervisor. This rule, Mr. Butler said, ap-

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plies equally to management and labor.

(4) Know your employees. They are people. They are human beings and as such have definite likes and dislikes and they must be treated as human beings and not as machines, Mr. Butler said.

(5) Work on the basis of what, not who, is right by being objective, Mr. Butler said. You manage to eliminate any personalities from any arguments or difference of opinion and he advised that the point at issue should not be the individual but the ideal or what is specified in the contract.

The concluding item on the morning program Oct. 17 was a brief discussion by Robert O. Fletcher, executive secretary of the Pacific Northwest Crop Improvement Assn. Mr. Fletcher discussed new wheat variety releases in the Pacific Northwest and the production trends that were being indicated for that area.

Development of Corrugated Rolls

A review of the development of corrugated rolls in flour mills was presented by R. M. Blasen of the J. J. Ross Mill Furnishing Co., Portland, Ore. Mr. Blasen's address was supplemented by a diagram which showed magnified or enlarged cross-section profiles of a large number of different corrugations in past and present use in flour mills and he pointed out on the chart the basic differences between the different corrugations. The content of his address indicated that the author had gone to considerable work in referring to historical publications for his information.

A paper on the history and the development of formula feeds in the U.S. was presented by J. F. Claypool, products control chemist for the Centennial Flouring Mills, Spokane, Wash. Mr. Claypool traced the development of formula feed used from its beginning and said that the most rapid strides have been made in the past six or seven years with the discovery by biochemists of the importance of trace elements, antibiotics and other component parts of a scientifically blended feed.

"Accident Prevention On and Off the Job," was the title of an address presented by T. J. Woodward, safety engineer for the Fisher Flouring Mills Co. of Seattle. He said that no firm is too large or too small to have an effective safety program and that no place is free from hazards, and third, no person is free from the danger of having an accident.

He said that accident prevention consists of organization and education and that to have a good safety program, one must "keep at it all the time." Management, he said, must supply the leadership and be prepared

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to spend money to eliminate hazards in the plant. He said also that the cooperation of the employees is also essential. He recommended that safety committees be set up and that each department hold its own safety meetings which should be simple and of short duration, and that once each two weeks is frequent enough for the meetings. He said that a meeting should be held on company time. Any safety program, he said, needs constant supervision and a follow-up. Mr. Woodward also recommended that all foremen should be qualified first aid men and that the Red Cross chapters in the various cities would cooperate in offering the first aid training necessary. This is necessary, he explained, because after an accident has happened, a person or persons not familiar with first aid procedures ofttimes can do more harm than good to the person injured while waiting for medical attention.

Safety Program in Homes

The speaker also recommended that the safety program should be extended to include the employee's home and stress safe driving, elimination of fire hazards in the home, and also elimination of accident hazards in the home. He said this could be done by mailing literature to the employee's home and that the literature should be accompanied by a covering letter from the management stating plainly why the material was being sent.

A review of current activities of the Association of Operative Millers was presented by Donald S. Eber, executive secretary of the association.

Before becoming executive secretary, Mr. Eber was superintendent of the Spokane plant of Centennial Flouring Mills Co. and was also secretary of the Pacific District. He said that he appreciated the opportunity to "come back home each year." In his brief report, Mr. Eber told of the recent meetings of the association's research, sanitation, and education committees. He said the research committee met with different manufacturers to review their problems and recommend solutions. The sanitation committee, he said, would soon begin production of a food industry sanitation manual.

The education committee currently is working on a cereal processor's handbook that it hopes to have ready in the coming year.

Membership Drive Trophy

Mr. Eber also showed the audience a trophy that Mr. Kehr, former chairman of the membership committee, had posted for presentation to the AOM member who accounts for the largest number of new memberships in the organization. The winner's name will be engraved upon the cup.

Mr. Eber told of plans for the 1953 technical conference which will be held in Minneapolis May 17-21. He said that it is anticipated that the machinery exposition will be as large as the one held last May in Buffalo. He urged the members to work for more members and complimented District 9 on its educational assistance program for young millers.

Edward F. Seeborg, a member of the staff of the Western Wheat Quality Laboratory at Pullman, Wash., in an address dealing with the structural and compositional differences in Pacific Northwest wheats, said that research has disclosed that endosperm cell walls vary between varieties and that the endosperm cell wall thickness also was found to vary within a variety of wheat. He said that the composition of the wheat correlates highly with its performance in the mill.

The election of officers of the Pacific District to serve during 1953 was the final item on the program for the afternoon session, Oct. 17, and the following men were elected:

Homer Mesler, Baker (Ore.) Mill & Grain Co., chairman; John Geddis, General Mills, Inc., Tacoma, Wash., vice chairman; Francis King, Wallace & Tiernan Co., Inc., Walla Walla, Wash., secretary-treasurer. Glen Fisher of the Fisher Flouring Mills, Seattle, was elected to the district executive committee and George Lowery, Preston-Shaffer Milling Co., Walla Walla, was elected to the national executive committee to serve out the remainder of the term of Willard H. Meinecke, General Mills, Inc., Tacoma, who was elected vice president of the national organization at the 1952 conference.

Presentations made at the annual banquet during the evening of Oct. 17 included a Distinguished Service Award to John Egli for his service to the organization as chairman of the district for the past year, a diploma to Leonard Kosderka of the Spokane Flour Mills for his completion of the AOM correspondence course, and checks to each of the three winners in the essay contest sponsored by the North Pacific Millers Assn. Glen Bayne of the Preston-Shaffer organization represented the millers association and the three prize winners were Henry Nelson, Fisher Flouring Mills Co.; Richard Schmidt, General Mills, Inc., and Robert Hart of the Igleheart Bros. Division of General Foods, Pendleton, Ore.

The first item on the program for the final session of the convention Oct. 18 was a paper presented by John Geddis of General Mills' plant at Tacoma, Wash. Mr. Geddis' address was entitled, "Scales, the Miller's Ammeter." The speaker had many helpful suggestions to offer regarding the ways a miller could utilize scales to control his operations.

Mr. Geddis said that many improve-

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ments could be made in the average flour mill by utilizing developments of other industries. He said that scales were both of the batch and continuous type with a totalizer and said that a scale on the patent stream in a mill served as a good indicator of the mill's performance. The chart supplied by a totalizing scale, he said, is a good visual training device and also is of much assistance in analyzing trouble when a mill becomes out of balance.

Methods for Progress

He advised millers not to wait for "some revolutionary process" to bring about changes in the method of manufacturing flour but to take advantage of the many new ideas, either large or small, that serve as an aid to process simplification and better control of the manufacturing process.

A simplified flow diagram of a 5-break, 7-reduction mill was presented by Henry Nelson of the Fisher Flouring Mills Co., Seattle. Mr. Nelson's flow diagram and its explanation won for him first prize in the essay contest and his presentation consisted principally of an explanation of the diagram which he had prepared. The simplified flow diagram eliminated such information as differential speeds, roll corrugations, cloth numbers and other data which, he said, often confused the apprentice miller in his attempt to get a mental picture of the flow of the different stocks through the mill by a study of a mill flow sheet.

He said also that the simplified flow diagram was useful in planning revisions for increasing capacity of flour mills and observed that there are two ways to increase a mill's capacity. The first way, he said, was to put in some more machinery and the second way was to throw some machinery out.

A discussion of current flour production data and the trend in mill modernization was presented by Paul L. Dittemore, a member of the editorial staff of the Miller Publishing Co., publisher of this journal. The text of his address appears elsewhere in this issue.

The final address of the morning session was presented by William E. Hall, a research assistant at the Sherman Branch Experiment Station, Moro, Ore.

Mr. Hall discussed the micro-milling of F-3 generation winter wheat selections in order to determine early in the breeding program what the milling characteristics of the wheat's understudy might be. The text of Mr. Hall's address will appear in an early issue of this journal.

A short business session completed the convention and it was decided during the business session that the meeting in 1953 will be held at Tacoma, Wash.

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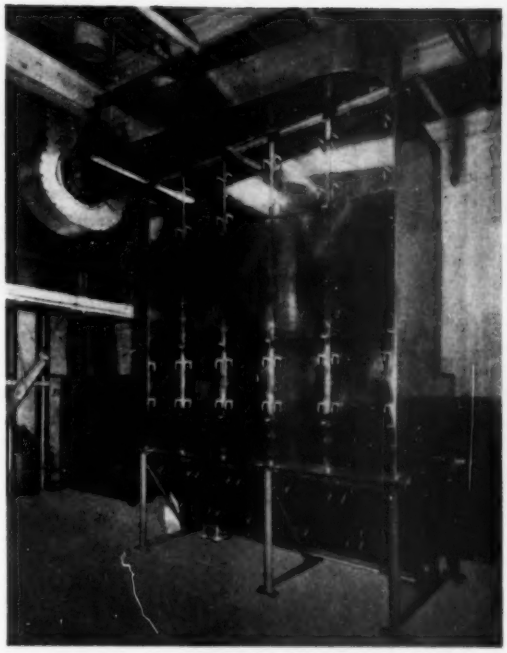

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